United States Department of Agriculture
Natural Resources Conservation Service

Ecological Site Description

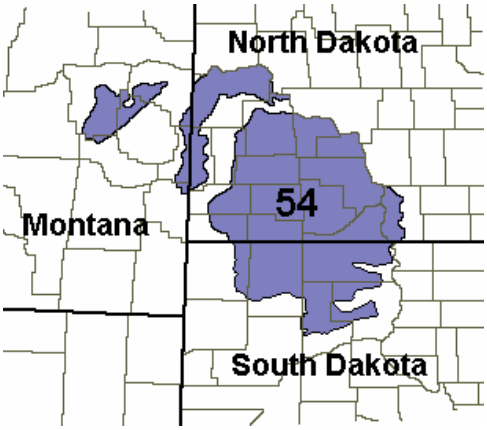
Site Name: Shallow Loamy

Site Type: Rangeland

Site ID: R054XY030ND

Major Land Resource Area (MLRA): 54 – Rolling Soft Shale Plain

For more information on MLRA's refer to the following web site: http://www.essc.psu.edu/soil_info/soil_lrr/.



Physiographic Features

This site typically occurs on moderately sloping to very steep sedimentary uplands.

Landform: hill, knoll, and ridge **Aspect:** NA

	Minimum	Maximum
Elevation (feet):	1600	3600
Slope (percent):	6	50
Water Table Depth (inches):	None	None
Flooding:		
Frequency:	None	None
Duration:	None	None
Ponding:		
Depth (inches):	None	None
Frequency:	None	None
Duration:	None	None
Runoff Class:	Medium	High

Climatic Features

MLRA 54 is considered to have a continental climate – cold winters and hot summers, low humidity, light rainfall, and much sunshine. Extremes in temperature are characteristic. The climate is the result of this MLRA's location in the geographic center of North America. There are few natural barriers on the northern Great Plains. The air masses move unobstructed across the plains and account for rapid changes in temperature.

Annual precipitation ranges from 14 to 18 inches per year. The normal average annual temperature is about 42°F. January is the coldest month with average temperatures ranging from about 13°F (Beach, North Dakota (ND),) to about 16°F (Bison, South Dakota (SD)). July is the warmest month with temperatures averaging from about 69°F (Beach, ND,) to about 72°F (Timber Lake, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 57°F. This large annual range attests to the continental nature of this MLRA's climate. Hourly winds are estimated to average about 11 miles per hour annually, ranging from about 13 miles per hour during the spring to about 10 miles per hour during the summer. Daytime winds are generally

stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 miles per hour.

Growth of native cool-season plants begins in late March and continues to early to mid July. Native warm-season plants begin growth in mid May and continue to the end of August. Green up of cool-season plants can occur in September and October when adequate soil moisture is present.

	Minimum	Maximum
Frost-free period (days):	119	136
Freeze-free period (days):	139	157
Mean Annual Precipitation (inches):	14	18

Average Monthly Precipitation (inches) and Temperature (ºF):

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.41	0.54	2.2	23.8
February	0.37	0.61	8.7	30.4
March	0.51	1.07	17.1	40.0
April	1.13	1.88	28.9	56.8
May	1.98	2.83	40.5	69.3
June	2.83	3.29	49.8	78.3
July	2.05	2.25	54.6	85.2
August	1.49	2.07	53.0	84.3
September	1.29	1.45	42.0	73.4
October	0.89	1.35	31.6	60.4
November	0.48	0.61	19.0	41.5
December	0.42	0.55	8.1	29.0

Climate Stations		Period	
Station ID	**Location or Name**	**From**	**To**
ND0590	Beach	1949	1999
MT7560	Sidney	1949	1999
SD8307	Timber Lake	1948	1999
ND2183	Dickinson FAA AP	1948	1999

For local climate stations that may be more representative, refer to http://www.wcc.nrcs.usda.gov.

Influencing Water Features

No significant water features influence this site.

Representative Soil Features

The common features of soils in this site are the loam to silty clay loam textured substratum and slopes of 2 to 50 percent. The soils in this site are well drained and formed in soft siltstone, mudstone, or sandstone. The silt loam to loam surface layer is two to six inches thick. The soils have a slow to moderately rapid infiltration rate. This site should show slight to no evidence of rills, wind scoured areas or pedestalled plants. Water flow paths are broken, irregular in appearance, or discontinuous with numerous debris dams or vegetative barriers. The soil surface is stable and intact.

These soils are mainly susceptible to water erosion. The hazard of water erosion increases on slopes greater than about 15 percent. Low available water capacity coupled with high accumulations of lime and slow permeability strongly influences the soil-water-plant relationship. Loss of the soil surface layer can result in a shift in species composition and/or production.

Major soil series correlated to this ecological site can be found in Section II of the Natural Resources Conservation Service (NRCS) Field Office Technical Guide or the following web sites:

North Dakota: http://www.nd.nrcs.usda.gov.
South Dakota: http://www.sd.nrcs.usda.gov.
Montana: http://www.mt.nrcs.usda.gov.

Parent Material Kind: residuum
Parent Material Origin: sedimentary, unspecified
Surface Texture: loam, silt loam, silty clay loam
Surface Texture Modifier: none
Subsurface Texture Group: loamy
Surface Fragments ≤ 3" (% Cover): 0
Surface Fragments > 3" (%Cover): 0
Subsurface Fragments ≤ 3" (% Volume): 0-20
Subsurface Fragments > 3" (% Volume): 0-10

	Minimum	Maximum
Drainage Class:	well	well
Permeability Class:	moderately slow	moderate
Depth to first restrictive layer (inches):	10	20
Electrical Conductivity (mmhos/cm)*:	0	8
Sodium Absorption Ratio*:	0	5
Soil Reaction (1:1 Water)*:	6.1	9.0
Soil Reaction (0.1M CaCl2)*:	NA	NA
Available Water Capacity (inches)*:	2	4
Calcium Carbonate Equivalent (percent)*:	2	15

* - These attributes represent from 0-40 inches or to the first restrictive layer.

Plant Communities

Ecological Dynamics of the Site:
The site developed under Northern Great Plains climatic conditions, and included natural influence of large herbivores and occasional fire. Changes will occur in the plant communities due to climatic conditions and/or management actions. Due to the nature of the soils, the site is considered quite fragile. Under continued adverse impacts, a rapid decline in vegetative vigor and composition will occur. Under favorable vegetative management treatments the site can slowly return to the Historic Climax Plant Community (HCPC).

The plant community upon which interpretations are primarily based is the HCPC. The HCPC has been determined by study of rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts also have been considered. Subclimax plant communities, states, transitional pathways, and thresholds have been determined through similar studies and experience.

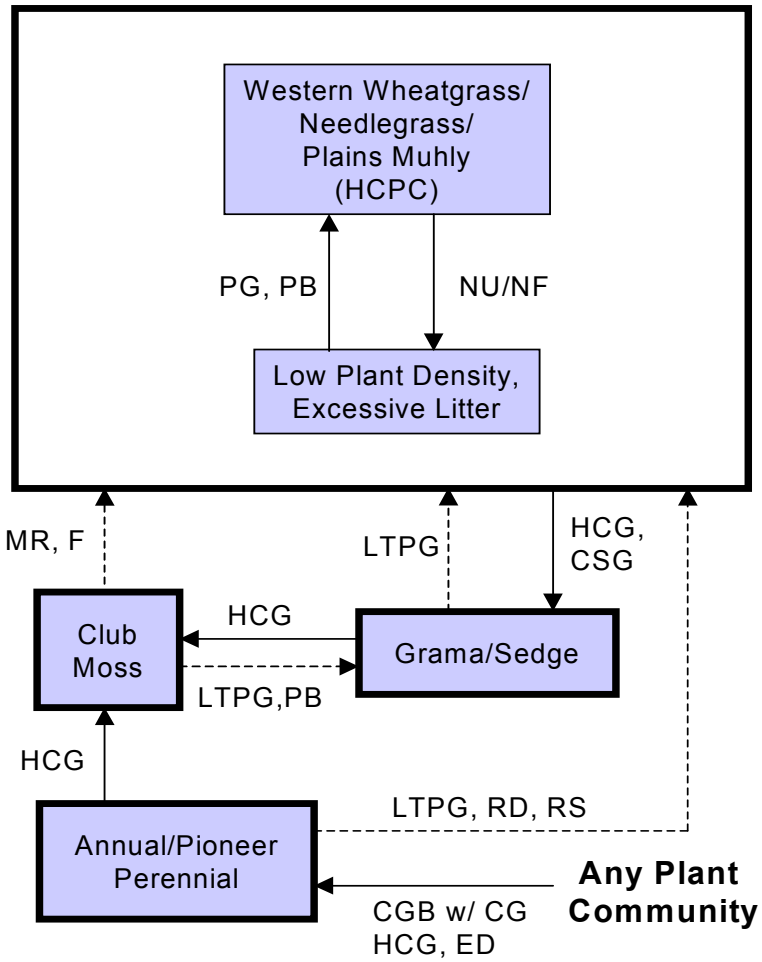
Continuous grazing without adequate recovery periods following each grazing occurrence over several years causes this site to depart from the HCPC. Species such as little bluestem, needleandthread, threadleaf sedge and blue grama will initially increase. Porcupine grass, green needlegrass, plains muhly and sideoats grama will decrease in frequency and production. Heavy continuous grazing causes blue grama and/or threadleaf sedge to increase and eventually dominate and pioneer perennials, annuals, and club moss (in its range) to increase. In time, heavy continuous grazing will likely cause upland sedges and blue grama to dominate and pioneer perennials, annuals,

and club moss (in its range) to increase. This plant community is relatively stable and the competitive advantage prevents other species from establishing. This plant community is less productive than the HCPC. Runoff increases and infiltration will decrease. Soil erosion will be minimal.

Under extended periods of non-use and/or lack of fire will result in a plant community having high litter levels, which favors an increase in Kentucky bluegrass and/or smooth bromegrass and in time, shrubs such as fringed sagewort and cactus will increase.

The following diagram illustrates the common plant communities and vegetation states commonly occurring on the site and the transition pathways between communities and states. The ecological processes will be discussed in more detail in the plant community descriptions following the diagram.

Plant Communities and Transitional Pathways



CGB w/ CG - cropped go-back with continuous grazing; **CSG** - continuous seasonal grazing; **ED** - excessive defoliation; **F** - fertilization followed by prescribed grazing; **HCPC** - Historical Climax Plant Community; **HCG** - heavy continuous grazing; **LTPG** - long-term prescribed grazing; **MR** - mechanical renovation with prescribed grazing; **NU/NF** - extended period of non-use & no fire; **PB** - prescribed burning; **PG** - prescribed grazing; **RD** - removal of disturbance; **RS** - range seeding followed by prescribed grazing.

Plant Community Composition and Group Annual Production

		Western Wheatgrass/Needlegrass/ Plains Muhly (HCPC)		
COMMON/GROUP NAME	SYMBOL	Group	lbs./acre	% Comp
GRASSES & GRASS-LIKES			*1120 - 1260*	*80 - 90*
WHEATGRASS		**1**	**70 - 210**	**5 - 15**
western wheatgrass	PASM	1	70 - 140	5 - 10
thickspike wheatgrass	ELLAL	1	0 - 70	0 - 5
NEEDLEGRASS		**2**	**140 - 280**	**10 - 20**
green needlegrass	NAVI4	2	70 - 140	5 - 10
porcupine grass	HESP11	2	70 - 210	5 - 15
needleandthread	HECOC8	2	28 - 70	2 - 5
WARM-SEASON MID GRASSES		**3**	**140 - 350**	**10 - 25**
little bluestem	SCSC	3	70 - 280	5 - 20
plains muhly	MUCU3	3	70 - 210	5 - 15
GRAMA		**4**	**112 - 168**	**8 - 12**
sideoats grama	BOCU	4	70 - 140	5 - 10
blue grama	BOGR2	4	42 - 70	3 - 5
OTHER NATIVE GRASSES		**5**	**70 - 140**	**5 - 10**
bluebunch wheatgrass	PSSP6	5	0 - 70	0 - 5
inland saltgrass	DISP	5	0 - 14	0 - 1
plains reedgrass	CAMO	5	14 - 14	1 - 1
prairie junegrass	KOMA	5	14 - 28	1 - 2
prairie sandreed	CALO	5	0 - 70	0 - 5
red threeawn	ARPUL	5	14 - 28	1 - 2
Sandberg bluegrass	POSE	5	14 - 14	1 - 1
slender wheatgrass	ELTRT	5	14 - 14	1 - 1
other perennial grasses	2GP	5	0 - 28	0 - 2
GRASS-LIKES		**6**	**70 - 98**	**5 - 7**
threadleaf sedge	CAFI	6	70 - 98	5 - 7
other grass-likes	2GL	6	0 - 14	0 - 1
FORBS		*7*	*70 - 140*	*5 - 10*
American pasqueflower	PUPA5	7	14 - 14	1 - 1
American vetch	VIAM	7	0 - 14	0 - 1
blanketflower	GAAR	7	14 - 14	1 - 1
cudweed sagewort	ARLU	7	0 - 14	0 - 1
cutleaf ironplant	MAPI	7	14 - 28	1 - 2
gayfeather	LIATR	7	28 - 42	2 - 3
goldenrod	SOLID	7	14 - 28	1 - 2
green sagewort	ARDR4	7	0 - 14	0 - 1
groundplum milkvetch	ASCR2	7	0 - 14	0 - 1
heath aster	SYER	7	14 - 14	1 - 1
Hood's phlox	PHHO	7	14 - 14	1 - 1
Indian breadroot	PEES	7	0 - 14	0 - 1
Lambert crazyweed	OXLA3	7	0 - 14	0 - 1
plains milkvetch	ASGI5	7	0 - 14	0 - 1
prairie clover	DALEA	7	28 - 42	2 - 3
prairie coneflower	RACO3	7	0 - 14	0 - 1
purple coneflower	ECAN2	7	28 - 42	2 - 3
pussytoes	ANTEN	7	0 - 14	0 - 1
rush skeletonweed	LYJU	7	14 - 14	1 - 1
scarlet gaura	GACO5	7	0 - 14	0 - 1
scarlet globemallow	SPCO	7	14 - 14	1 - 1
scurfpea	PSORA2	7	14 - 28	1 - 2
wavyleaf thistle	CIUN	7	14 - 14	1 - 1
western yarrow	ACMI2	7	14 - 28	1 - 2
wild onion	ALLIU	7	0 - 14	0 - 1
other perennial forbs	2FP	7	14 - 28	1 - 2
other annual forbs	2FA	7	14 - 14	1 - 1
SHRUBS		*8*	*28 - 70*	*2 - 5*
broom snakeweed	GUSA2	8	0 - 14	0 - 1
cactus	OPUNT	8	0 - 14	0 - 1
creeping juniper	JUHO2	8	0 - 14	0 - 1
fringed sagewort	ARFR4	8	14 - 28	1 - 2
rose	ROSA5	8	14 - 14	1 - 1
rubber rabbitbrush	ERNA10	8	0 - 14	0 - 1
skunkbush sumac	RHTR	8	0 - 14	0 - 1
winterfat	KRLA2	8	14 - 28	1 - 2
kinnikinnick	ARUV	8	0 - 14	0 - 1
other shrubs	2SHRUB	8	0 - 14	0 - 1
CRYPTOGAMS		*9*	*0 - 14*	*0 - 1*
clubmoss	SEDE2	9	0 - 14	0 - 1

Annual Production lbs./acre	LOW	RV	HIGH
GRASSES & GRASS-LIKES	710 -	1239	- 1765
FORBS	65 -	105	- 145
SHRUBS	25 -	49	- 75
CRYPTOGAMS	0 -	7	- 15
TOTAL	800 -	1400	- 2000

This list of plants and their relative proportions are based on near normal years. Fluctuations in species composition and relative production may change from year to year dependent upon precipitation or other climatic factors. RV = Representative Value.

Plant Community Composition and Group Annual Production

		Western Wheatgrass/Needle-grass/Plains Muhly (HCPC)			Grama/Sedge			Low Plant Density, Excessive Litter			Club Moss		
COMMON/GROUP NAME	SYMBOL	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
GRASSES & GRASS-LIKES			*1120 - 1260*	*80 - 90*		*320 - 360*	*80 - 90*		*975 - 1105*	*75 - 85*		*245 - 280*	*70 - 80*
WHEATGRASS		**1**	**70 - 210**	**5 - 15**	**1**	**20 - 40**	**5 - 10**	**1**	**130 - 195**	**10 - 15**	**1**	**18 - 35**	**5 - 10**
western wheatgrass	PASM	1	70 - 140	5 - 10	1	20 - 36	5 - 9	1	91 - 195	7 - 15	1	18 - 32	5 - 9
thickspike wheatgrass	ELLAL	1	0 - 70	0 - 5	1	4 - 20	1 - 5	1	0 - 104	0 - 8	1	4 - 18	1 - 5
NEEDLEGRASS		**2**	**140 - 280**	**10 - 20**	**2**	**12 - 20**	**3 - 5**	**2**	**130 - 195**	**10 - 15**	**2**	**11 - 18**	**3 - 5**
green needlegrass	NAVI4	2	70 - 140	5 - 10				2	65 - 130	5 - 10			
porcupine grass	HESP11	2	0 - 70	0 - 5				2	65 - 130	5 - 10			
needleandthread	HECOC8	2	70 - 140	5 - 10	2	12 - 20	3 - 5	2	65 - 130	5 - 10	2	11 - 18	3 - 5
WARM-SEASON MID GRASSES		**3**	**140 - 280**	**10 - 20**	**3**	**20 - 40**	**5 - 10**	**3**	**26 - 130**	**2 - 10**	**3**	**4 - 4**	**1 - 1**
little bluestem	SCSC	3	70 - 280	5 - 20	5	20 - 40	5 - 10	5	13 - 130	1 - 10	5	0 - 4	0 - 1
plains muhly	MUCU3	3	70 - 210	5 - 15	3	4 - 4	1 - 1	3	26 - 52	2 - 4	3	4 - 4	1 - 1
GRAMA		**4**	**112 - 168**	**8 - 12**	**4**	**40 - 80**	**10 - 20**	**4**	**13 - 26**	**1 - 2**	**4**	**53 - 70**	**15 - 20**
sideoats grama	BOCU	4	70 - 140	5 - 10	4	0 - 8	0 - 2	4	13 - 26	1 - 2			
blue grama	BOGR2	4	42 - 70	3 - 5	4	40 - 80	10 - 20	4	13 - 26	1 - 2	4	53 - 70	15 - 20
OTHER NATIVE GRASSES		**5**	**70 - 140**	**5 - 10**	**5**	**28 - 40**	**7 - 10**	**5**	**65 - 130**	**5 - 10**	**5**	**25 - 35**	**7 - 10**
bluebunch wheatgrass	PSSP6	5	0 - 70	0 - 5				5	0 - 39	0 - 3			
inland saltgrass	DISP	5	0 - 14	0 - 1	5	4 - 8	1 - 2	5	0 - 13	0 - 1	5	4 - 4	1 - 1
plains reedgrass	CAMO	5	14 - 14	1 - 1	5	0 - 4	0 - 1	5	13 - 13	1 - 1	5	0 - 4	0 - 1
prairie junegrass	KOMA	5	14 - 28	1 - 2	5	4 - 8	1 - 2	5	13 - 26	1 - 2	5	4 - 7	1 - 2
prairie sandreed	CALO	5	0 - 70	0 - 5	5	0 - 4	0 - 1	5	0 - 26	0 - 2			
red threeawn	ARPUL	5	14 - 28	1 - 2	5	8 - 12	2 - 3	5	26 - 39	2 - 3	5	7 - 11	2 - 3
Sandberg bluegrass	POSE	5	14 - 14	1 - 1	5	12 - 20	3 - 5	5	52 - 104	4 - 8	5	18 - 28	5 - 8
slender wheatgrass	ELTRT	5	14 - 14	1 - 1	5	4 - 8	1 - 2	5	26 - 39	2 - 3			
other perennial grasses	2GP	5	0 - 28	0 - 2	5	0 - 8	0 - 2	5	0 - 26	0 - 2	5	0 - 4	0 - 1
GRASS-LIKES		**6**	**70 - 98**	**5 - 7**	**6**	**60 - 84**	**15 - 21**	**6**	**91 - 130**	**7 - 10**	**6**	**53 - 70**	**15 - 20**
threadleaf sedge	CAFI	6	70 - 98	5 - 7	6	60 - 84	15 - 21	6	91 - 130	7 - 10	6	53 - 70	15 - 20
other grass-likes	2GL	6	0 - 14	0 - 1	6	0 - 4	0 - 1	6	13 - 26	1 - 2	6	0 - 4	0 - 1
NON-NATIVE GRASSES		**7**			**7**	**0 - 8**	**0 - 2**	**7**	**78 - 156**	**6 - 12**	**7**	**0 - 7**	**0 - 2**
cheatgrass	BRTE				7	0 - 8	0 - 2	7	0 - 65	0 - 5	7	0 - 7	0 - 2
crested wheatgrass	AGCR				7	0 - 8	0 - 2	7	0 - 65	0 - 5	7	0 - 7	0 - 2
smooth bromegrass	BRIN2							7	0 - 104	0 - 8			
bluegrass	POA							7	65 - 117	5 - 9			
FORBS		*8*	*70 - 140*	*5 - 10*	*8*	*32 - 48*	*8 - 12*	*8*	*130 - 195*	*10 - 15*	*8*	*35 - 49*	*10 - 14*
American pasqueflower	PUPA5	8	14 - 14	1 - 1	8	8 - 12	2 - 3	8	0 - 13	0 - 1	8	11 - 14	3 - 4
American vetch	VIAM	8	0 - 14	0 - 1	8	0 - 4	0 - 1	8	13 - 13	1 - 1			
blanketflower	GAAR	8	14 - 14	1 - 1				8	0 - 13	0 - 1			
common dandelion	TAOF				8	8 - 12	2 - 3	8	13 - 26	1 - 2	8	11 - 14	3 - 4
cudweed sagewort	ARLU	8	0 - 14	0 - 1	8	8 - 12	2 - 3	8	26 - 39	2 - 3	8	7 - 11	2 - 3
curlycup gumweed	GRSQ				8	4 - 16	1 - 4	8	13 - 26	1 - 2	8	4 - 11	1 - 3
cutleaf ironplant	MAPI	8	14 - 28	1 - 2	8	12 - 16	3 - 4	8	13 - 26	1 - 2	8	11 - 14	3 - 4
gayfeather	LIATR	8	28 - 42	2 - 3	8	4 - 4	1 - 1	8	13 - 26	1 - 2	8	0 - 4	0 - 1
goldenrod	SOLID	8	14 - 28	1 - 2	8	4 - 8	1 - 2	8	13 - 39	1 - 3	8	4 - 4	1 - 1
green sagewort	ARDR4	8	0 - 14	0 - 1	8	0 - 12	0 - 3	8	0 - 26	0 - 2	8	0 - 11	0 - 3
groundplum milkvetch	ASCR2	8	0 - 14	0 - 1	8	0 - 4	0 - 1	8	13 - 13	1 - 1			
heath aster	SYER	8	14 - 14	1 - 1	8	12 - 16	3 - 4	8	13 - 26	1 - 2	8	7 - 11	2 - 3
Hood's phlox	PHHO	8	14 - 14	1 - 1	8	4 - 4	1 - 1	8	13 - 13	1 - 1	8	4 - 4	1 - 1
Indian breadroot	PEES	8	0 - 14	0 - 1				8	13 - 13	1 - 1			
Lambert crazyweed	OXLA3	8	0 - 14	0 - 1	8	8 - 12	2 - 3	8	13 - 26	1 - 2	8	7 - 11	2 - 3
plains milkvetch	ASGI5	8	0 - 14	0 - 1	8	0 - 4	0 - 1	8	0 - 13	0 - 1	8	0 - 4	0 - 1
prairie clover	DALEA	8	28 - 42	2 - 3	8	0 - 4	0 - 1	8	13 - 26	1 - 2			
prairie coneflower	RACO3	8	0 - 14	0 - 1	8	12 - 16	3 - 4	8	26 - 39	2 - 3	8	11 - 14	3 - 4
purple coneflower	ECAN2	8	28 - 42	2 - 3	8	4 - 8	1 - 2	8	13 - 26	1 - 2	8	4 - 4	1 - 1
pussytoes	ANTEN	8	0 - 14	0 - 1	8	4 - 4	1 - 1	8	0 - 13	0 - 1	8	4 - 7	1 - 2
rush skeletonweed	LYJU	8	14 - 14	1 - 1	8	4 - 8	1 - 2	8	13 - 13	1 - 1	8	7 - 7	2 - 2
scarlet gaura	GACO5	8	0 - 14	0 - 1				8	13 - 13	1 - 1			
scarlet globemallow	SPCO	8	14 - 14	1 - 1	8	8 - 12	2 - 3	8	13 - 13	1 - 1	8	11 - 14	3 - 4
scurfpea	PSORA2	8	14 - 28	1 - 2	8	8 - 12	2 - 3	8	26 - 39	2 - 3	8	11 - 14	3 - 4
sweetclover	MELIL				8	0 - 20	0 - 5	8	0 - 65	0 - 5	8	0 - 11	0 - 3
wavyleaf thistle	CIUN	8	14 - 14	1 - 1	8	4 - 8	1 - 2	8	13 - 26	1 - 2	8	4 - 4	1 - 1
western salsify	TRDU				8	4 - 8	1 - 2	8	13 - 39	1 - 3	8	4 - 4	1 - 1
western yarrow	ACMI2	8	14 - 28	1 - 2	8	8 - 8	2 - 2	8	26 - 39	2 - 3	8	4 - 7	1 - 2
wild onion	ALLIU	8	0 - 14	0 - 1	8	4 - 4	1 - 1	8	13 - 13	1 - 1	8	4 - 4	1 - 1
woolly Indianwheat	PLPA2				8	4 - 4	1 - 1	8	13 - 13	1 - 1	8	4 - 7	1 - 2
other perennial forbs	2FP	8	14 - 28	1 - 2	8	4 - 8	1 - 2	8	13 - 26	1 - 2	8	4 - 7	1 - 2
other annual forbs	2FA	8	14 - 14	1 - 1	8	4 - 4	1 - 1	8	13 - 13	1 - 1	8	4 - 4	1 - 1
SHRUBS		*9*	*28 - 70*	*2 - 5*	*9*	*20 - 32*	*5 - 8*	*9*	*65 - 130*	*5 - 10*	*9*	*18 - 28*	*5 - 8*
broom snakeweed	GUSA2	9	0 - 14	0 - 1	9	8 - 12	2 - 3	9	13 - 13	1 - 1	9	11 - 14	3 - 4
cactus	OPUNT	9	0 - 14	0 - 1	9	8 - 12	2 - 3	9	26 - 39	2 - 3	9	11 - 14	3 - 4
creeping juniper	JUHO2	9	0 - 14	0 - 1	9	0 - 8	0 - 2	9	0 - 26	0 - 2	9	0 - 7	0 - 2
fringed sagewort	ARFR4	9	14 - 28	1 - 2	9	12 - 20	3 - 5	9	39 - 52	3 - 4	9	14 - 21	4 - 6
rose	ROSA5	9	14 - 14	1 - 1	9	4 - 8	1 - 2	9	13 - 26	1 - 2	9	4 - 4	1 - 1
rubber rabbitbrush	ERNA10	9	0 - 14	0 - 1	9	0 - 8	0 - 2	9	0 - 26	0 - 2	9	0 - 11	0 - 3
skunkbush sumac	RHTR	9	0 - 14	0 - 1	9	0 - 4	0 - 1	9	0 - 26	0 - 2			
winterfat	KRLA2	9	14 - 28	1 - 2				9	26 - 39	2 - 3			
kinnikinnick	ARUV	9	0 - 14	0 - 1				9	0 - 26	0 - 2			
other shrubs	2SHRUB	9	0 - 14	0 - 1	9	0 - 4	0 - 1	9	0 - 13	0 - 1	9	0 - 4	0 - 1
CRYPTOGAMS		*10*	*0 - 14*	*0 - 1*	*10*	*4 - 8*	*1 - 2*	*10*	*0 - 13*	*0 - 1*	*10*	*18 - 35*	*5 - 10*
clubmoss	SEDE2	10	0 - 14	0 - 1	10	4 - 8	1 - 2	10	0 - 13	0 - 1	10	18 - 35	5 - 10

Annual Production lbs./acre	LOW RV HIGH	LOW RV HIGH	LOW RV HIGH	LOW RV HIGH
GRASSES & GRASS-LIKES	710 - 1239 - 1765	205 - 328 - 505	615 - 1034 - 1450	140 - 259 - 380
FORBS	65 - 105 - 145	30 - 40 - 50	125 - 163 - 200	30 - 42 - 50
SHRUBS	25 - 49 - 75	15 - 26 - 35	60 - 98 - 135	15 - 23 - 30
CRYPTOGAMS	0 - 7 - 15	0 - 6 - 10	0 - 7 - 15	15 - 26 - 40
TOTAL	800 - 1400 - 2000	250 - 400 - 600	800 - 1300 - 1800	200 - 350 - 500

This list of plants and their relative proportions are based on near normal years. Fluctuations in species composition and relative production may change from year to year dependent upon precipitation or other climatic factors. RV = Representative value.

Plant Community and Vegetation State Narratives

Following are the narratives for each of the described plant communities. These plant communities may not represent every possibility, but they are the most prevalent and repeatable plant communities. The plant composition tables shown above have been developed from the best available knowledge at the time of this revision. As more data are collected, some of these plant communities may be revised or removed, and new ones may be added. None of these plant communities should necessarily be thought of as "Desired Plant Communities" (DPC). According to the USDA NRCS National Range and Pasture Handbook, DPC's will be determined by the decision-makers and will meet minimum quality criteria established by the NRCS. The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

Little Bluestem/Needlegrass/Plains Muhly Plant Community

This is the interpretive plant community and is considered to be the HCPC. This community evolved with grazing by large herbivores and occasional prairie fire. It is well suited for grazing by domestic livestock and can be found on areas that are properly managed with prescribed grazing that allows for proper utilization, changes in season of use and adequate recovery periods following each grazing event.

The potential vegetation is about 80 percent grasses or grass-like plants, 12 percent forbs, 7 percent shrubs, and 1 percent cryptogams. Cool-season grasses dominate this plant community. The major grasses include little bluestem, needle grasses, plains muhly, and western wheatgrass. Other grasses occurring on the site include sideoats grama, prairie Junegrass, red threeawn, and blue grama. The significant forbs include gayfeather, purple coneflower, prairie clover, and cutleaf ironplant. Significant shrubs may include fringed sagewort and rose.

This plant community is well adapted to the Northern Great Plains climatic conditions. Individual species can vary greatly in production depending on growing conditions (timing and amount of precipitation and temperature). Community dynamics, nutrient cycle, water cycle, and energy flow are functioning properly. Plant litter is properly distributed with very little movement offsite and natural plant mortality is very low. The diversity in plant species allows for high drought tolerance.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during a normal year:
Growth curve number: ND5402
Growth curve name: Missouri Slope, Native Grasslands, Cool/Warm-season Mix.
Growth curve description: Cool-season/tall warm-season dominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	2	6	21	40	20	6	4	1	0	0

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Non-use and no fire for extended periods of time will convert this plant community to the *Low Plant Density, Excessive Litter Plant Community*.
- Heavy, continuous grazing or continuous seasonal grazing (spring) will convert the plant community to the *Grama/Sedge Plant Community*.
- Excessive defoliation (i.e., areas of heavy animal concentration) will convert the plant community to the *Annual/Pioneer Perennial Plant Community*.
- Cropped go-back land with continuous grazing will convert this plant community to the *Annual/Pioneer Perennial Plant Community*.

Grama/Sedge Plant Community

This plant community is the result of long-term, heavy, continuous grazing and/or continuous seasonal grazing (annual, early spring, seasonal grazing). Annual, grazing too early in the spring depletes stored carbohydrates, resulting in weakening and eventual death of the cool season mid-grasses. Short grasses and forbs increase to dominate and annual production decreases dramatically. Lack of litter and reduced plant vigor result in higher soil temperatures, poor water infiltration rates, and high evapotranspiration, which gives blue grama a competitive advantage over cool season mid-grasses. This plant community can occur throughout the pasture, on spot grazed areas, and around water sources where season-long grazing patterns occur.

Blue grama and threadleaf sedge are the dominant grass/grass-like species. Other grasses include western wheatgrass, needleandthread, little bluestem, prairie Junegrass, and red threeawn. Significant forbs include American pasqueflower, cutleaf ironplant, groundplum milkvetch, prairie coneflower, and scarlet globemallow. There is usually less than 10 percent bare ground. The significant shrubs include broom snakeweed and fringed sagewort.

This plant community is relatively stable. The thick sod and competitive advantage prevents other species from establishing. This plant community is less productive than the HCPC. Runoff increases and infiltration will decrease. Soil erosion will be minimal.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during a normal year:
Growth curve number: ND5404
Growth curve name: Missouri Slope, Warm-season Dominant, Cool-season Subdominant.
Growth curve description: Short warm-season dominant, mid cool-season subdominant and club moss.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	1	5	20	38	25	8	3	0	0	0

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Long-term prescribed grazing that includes changing season of use and allowing adequate recovery periods to enhance cool season grasses will slowly lead this plant community back to the *Western Wheatgrass/Needlegrass/Plains Muhly Plant Community*.

- Heavy, continuous grazing will cause further deterioration resulting in a shift to the *Club Moss Plant Community*.

- Excessive defoliation (i.e., areas of heavy animal concentration) will convert the plant community to the *Annual/Pioneer Perennial Plant Community*.

- Cropped go-back land with continuous grazing will convert this plant community to the *Annual/Pioneer Perennial Plant Community*.

Low Plant Density, Excessive Litter Plant Community

This plant community develops after an extended period of 15 or more years of non-use by herbivores and exclusion of fire. This plant community is dispersed throughout the pasture, encircling spot grazed areas, and areas distant from water sources. This is a typical pattern found in properly stocked pastures grazed season-long. Plant litter may accumulate as this plant community first develops. Due to a lack of tiller stimulation and sunlight, native bunchgrasses typically develop dead centers and native rhizomatous grasses are limited to colonies. Standing decadent plants and moderate litter covers shorter understory species (i.e., short grasses and sedges,) restricting their ability to capture adequate sunlight for photosynthesis. Vigor and diversity of native plants are

reduced. Annual and/or biennial forbs, annual grasses, and cryptogams commonly fill interspaces once occupied by desirable species.

Kentucky bluegrass, crested wheatgrass, smooth bromegrass, cheatgrass, and sweetclover tend to invade and may dominate this plant community. Other grasses present include western wheatgrass, needleandthread, green needlegrass. The common forbs include green sagewort, cudweed, and heath aster. Fringed sagewort and brome snakeweed are the principal shrubs.

This plant community is resistant to change without prescribed grazing or fire. The combination of both grazing and fire is most effective in moving this plant community towards the HCPC. Soil erosion is low. Compared to the HCPC, infiltration is reduced to the lower root zone. Runoff is similar to the HCPC. This plant community tends to favor early cool season plant species which are moisture loving and usually tends to utilize the spring moisture quickly causing the forage base to become dry and not very palatable early in the summer. Once this plant community is reached, any of the preferred treatments can readily return the diversity and production of the site.

The following growth curve represents monthly percentages of total annual growth of the dominant species during a normal year:
Growth curve number: ND5406
Growth curve name: Missouri Slope, Introduced Cool-season Grasses.
Growth curve description: Introduced cool-season grasses.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	10	35	35	5	2	8	2	0	0

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Prescribed grazing or prescribed burning followed by prescribed grazing will move this plant community toward the *Western Wheatgrass/Needlegrass/Plains Muhly Plant Community*. This would require long-term management with prescribed grazing and/or prescribed burning under controlled conditions.

Club Moss Plant Community

This plant community typically occurs in the western portion of MLRA 54. A dense sod of club moss dominates this plant community. Club moss occupies bare soil areas within deteriorated or disturbed higher successional plant communities due to long-term repeated disturbances. Club moss cover is often 25 percent or greater. Club moss creates a more arid microclimate, resulting in extreme competition for available moisture. Vigor and production of other species is reduced dramatically.

Grasses and grass-like plants include western wheatgrass, needleandthread, blue grama, red threeawn, Sandberg bluegrass, and upland sedges. Forbs commonly found in this plant community include American pasqueflower, cutleaf ironplant, prairie coneflower, scarlet globemallow, and scurfpea. Significant shrubs include broom snakeweed and fringed sagewort. When compared to the HCPC, blue grama and club moss have increased, while western wheatgrass has decreased and green needlegrass may be absent.

This plant community is very resistant to change. The thick sod and competitive advantage of both the clubmoss and the blue grama prevents other species from expanding and establishing. This plant community is far less productive than the HCPC. Initial runoff rates are low but then increase as clubmoss becomes saturated. Once clubmoss has been saturated then runoff increases and infiltration decreases as compared HCPC. Soil erosion will be minimal due to the sod forming habit of both the clubmoss and blue grama.

The following growth curve represents monthly percentages of total annual growth of the dominant species during a normal year:
Growth curve number: ND5404
Growth curve name: Missouri Slope, Warm-season Dominant, Cool-season Subdominant.
Growth curve description: Short warm-season dominant, mid cool-season subdominant and club moss.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	1	5	20	38	25	8	3	0	0	0

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Fertilization followed by prescribed grazing will move this plant community through the successional stages, eventually leading toward the *Western Wheatgrass/Needlegrass/Plains Muhly Plant Community*.

- Mechanical renovation followed by prescribed grazing will reduce club moss, increase western wheatgrass, and eventually shift this plant community back toward the *Western Wheatgrass/Needlegrass/Plains Muhly Plant Community*.

- Prescribed burning followed by prescribed grazing will reduce club moss, increase western wheatgrass, and eventually shift this plant community to the *Grama/Sedge Plant Community*.

- Long-term prescribed grazing will eventually convert this plant community to the *Grama/Sedge Plant Community*.

- Cropped go-back land with continuous grazing will convert this plant community to the *Annual/Pioneer Perennial Plant Community*.

Annual/Pioneer Perennial Plant Community

This plant community develops under severe disturbance and/or excessive defoliation. This can result from heavy livestock or wildlife concentration, and cropping abandonment (go-back land). The dominant vegetation includes pioneer annual grasses, forbs, invaders, and early successional biennial and perennial species. Grasses may include red threeawn, sixweeks fescue, smooth bromegrass, crested wheatgrass, annual brome, needleandthread, green needlegrass, prairie Junegrass, western wheatgrass, and little bluestem. The dominant forbs include curlycup gumweed, marestail, salsify, kochia, field bindweed, thistles, western ragweed, pussytoes, prostrate verbena, and other early successional species. Shrubs that may be present include prairie rose and broom snakeweed. Plant species from adjacent ecological sites may become minor components of this plant community. The community also is susceptible to invasion by non-native species due to severe soil disturbances and relatively high percent of bare ground. Compared to the HCPC, western wheatgrass, porcupinegrass, sideoats grama, and blue grama have disappeared. Many annual and perennial forbs, including non-native species, have invaded the site.

This plant community is resistant to change, as long as soil disturbance or severe vegetation defoliation persists, thus holding back secondary plant succession. Soil erosion is potentially high. Reduced surface cover, low plant density, low plant vigor, loss of root biomass, and soil compaction all contribute to decreased water infiltration, increased runoff, and accelerated erosion rates.

Significant economic inputs, management, and time would be required to move this plant community toward a higher successional stage and a more productive plant community. Secondary succession is highly variable, depending upon availability and diversity of a viable seed bank of higher successional species within the existing plant community and neighboring plant communities. This plant community can be renovated to improve the production capability, but management changes

would be needed to maintain the new plant community. The total annual production ranges from 300 to 1,000 lbs./ac. (air-dry weight) depending upon growing conditions.

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Under long-term prescribed grazing and/or removal of disturbance, including adequate rest periods, this plant community will move through the successional stages, and may eventually lead to a plant community resembling the (HCPC) *Western Wheatgrass/Needlegrass/Plains Muhly Plant Community*. This process will likely take a long period of time (50+ years). Depending on the slope, aspect, and size, and if adequate perennial plants exist, this change can occur more rapidly.

- Range seeding with deferment and prescribed grazing can convert this to a plant community closely resembling the *Western Wheatgrass/Needlegrass/Plains Muhly Plant Community*.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

-- Under Development --

Western Wheatgrass/Needlegrass/Plains Muhly Plant Community:

Grama/Sedge Plant Community:

Low Plant Density, Excessive Litter Plant Community:

Club Moss Plant Community:

Annual/Pioneer Perennial Plant Community:

Animal Preferences (Quarterly – 1,2,3,4†)

Common Name	Cattle				Sheep				Horses				Deer				Antelope				Bison				Elk			
Grasses & Grass-likes																												
blue grama	U	D	P	U	D	P	P	D	U	D	P	U	D	P	P	D	D	P	P	D	U	D	P	U	U	D	P	U
bluebunch wheatgrass	U	P	D	D	P	P	P	P	U	P	D	D	D	D	D	D	D	D	D	D	U	P	D	D	U	P	D	D
bluegrass	U	D	U	U	D	P	U	D	U	D	U	U	U	P	N	D	U	P	N	D	U	D	U	U	U	D	U	U
cheatgrass	U	D	U	U	N	P	U	N	U	D	U	U	N	P	U	N	N	P	U	N	U	D	U	U	U	D	U	U
crested wheatgrass	U	P	U	D	U	P	N	N	U	P	U	D	U	P	N	N	U	P	N	N	U	P	U	D	U	P	U	D
green needlegrass	U	P	U	D	N	P	N	P	U	P	U	D	N	P	N	P	N	P	N	P	U	P	U	D	U	P	U	D
inland saltgrass	N	U	U	N	N	N	N	N	N	U	U	N	N	N	N	N	N	N	N	N	N	U	U	N	N	U	U	N
little bluestem	U	D	D	U	N	D	N	N	U	D	D	U	N	D	N	N	N	D	N	N	U	D	D	U	U	D	D	U
needleandthread	U	D	U	D	N	D	N	U	U	D	U	D	N	D	N	U	N	D	N	U	U	D	U	D	U	D	U	D
plains muhly	U	U	D	U	U	U	D	U	U	U	D	U	N	N	N	N	N	N	N	N	U	U	D	U	U	U	D	U
plains reedgrass	U	D	U	U	N	D	N	N	U	D	U	U	N	D	N	N	N	D	N	N	U	D	U	U	U	D	U	U
porcupine grass	U	P	U	D	N	D	N	U	U	P	U	D	N	D	N	U	N	D	N	U	U	P	U	D	U	P	U	D
prairie junegrass	U	D	U	D	N	D	N	U	U	D	U	D	N	D	N	U	N	D	N	U	U	D	U	D	U	D	U	D
prairie sandreed	U	D	D	U	U	D	U	U	U	D	D	U	U	U	D	U	U	U	D	U	U	D	D	U	U	D	D	U
red threeawn	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Sandberg bluegrass	N	U	N	N	N	D	N	N	N	U	N	N	N	D	N	N	N	D	N	N	N	U	N	N	N	U	N	N
sideoats grama	U	D	P	U	U	P	D	U	U	D	P	U	U	P	D	U	U	P	D	U	U	D	P	U	U	D	P	U
slender wheatgrass	U	P	U	U	N	D	U	N	U	P	U	U	N	D	U	N	N	D	U	N	U	P	U	U	U	P	U	U
smooth bromegrass	U	P	U	U	U	P	U	U	U	P	U	U	U	P	U	U	U	P	U	U	U	P	U	U	U	P	U	U
thickspike wheatgrass	U	D	D	U	N	D	N	N	U	D	D	U	N	D	N	N	N	D	N	N	U	D	D	U	U	D	D	U
threadleaf sedge	U	D	U	D	U	P	N	D	U	D	U	D	U	D	U	D	U	D	U	D	U	D	U	D	U	D	U	D
western wheatgrass	U	P	D	U	N	D	N	N	U	P	D	U	N	D	N	N	N	D	N	N	U	P	D	U	U	P	D	U
Forbs																												
American pasqueflower	N	N	N	N	N	U	N	N	N	N	N	N	N	U	N	N	N	U	N	N	N	N	N	N	N	N	N	N
American vetch	U	D	P	U	U	P	P	U	U	D	P	U	U	P	P	U	U	P	P	U	U	D	P	U	U	P	P	U
blanketflower	U	U	U	U	N	U	U	N	U	U	U	U	N	U	U	N	N	U	U	N	U	U	U	U	N	U	U	N
cudweed sagewort	U	U	U	U	U	U	D	U	U	U	U	U	U	U	D	U	U	U	D	U	U	U	U	U	U	U	D	U
cutleaf ironplant	U	U	U	U	N	U	U	N	U	U	U	U	N	U	U	N	N	U	U	N	U	U	U	U	N	U	U	N
gayfeather	U	U	D	U	U	P	P	U	U	U	D	U	U	P	P	U	U	P	P	U	U	U	D	U	U	P	P	U
goldenrod	U	U	D	U	N	U	U	N	U	U	D	U	N	U	U	N	N	U	U	N	U	U	D	U	N	U	U	N
green sagewort	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
groundplum milkvetch	U	D	U	U	U	D	D	U	U	D	U	U	U	D	D	U	U	D	D	U	U	D	U	U	U	D	D	U
heath aster	U	U	D	U	U	U	P	U	U	U	D	U	U	U	P	U	U	U	P	U	U	U	D	U	U	U	P	U
Hood's phlox	U	D	U	U	U	P	P	U	U	D	U	U	U	P	P	U	U	P	P	U	U	D	U	U	U	P	P	U
Indian breadroot	U	U	U	U	U	D	U	U	U	U	U	U	U	D	U	U	U	D	U	U	U	U	U	U	U	D	U	U
Lambert crazyweed	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
prairie clover	U	D	P	U	U	P	P	U	U	D	P	U	U	P	P	U	U	P	P	U	U	D	P	U	U	P	P	U
prairie coneflower	U	U	D	U	U	P	P	U	U	U	D	U	U	P	P	U	U	P	P	U	U	U	D	U	U	P	P	U
purple coneflower	U	U	D	U	U	P	P	U	U	U	D	U	U	P	P	U	U	P	P	U	U	U	D	U	U	P	P	U
pussytoes	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
rush skeletonweed	U	U	U	U	N	N	N	N	U	U	U	U	N	N	N	N	N	N	N	N	U	U	U	U	N	N	N	N
scarlet gaura	U	U	U	U	N	U	U	N	U	U	U	U	N	U	U	N	N	U	U	N	U	U	U	U	N	U	U	N
scarlet globemallow	U	U	D	U	U	D	D	U	U	U	D	U	U	D	D	U	U	D	D	U	U	U	D	U	U	D	D	U
scurfpea	U	U	U	U	N	U	U	N	U	U	U	U	N	U	U	N	N	U	U	N	U	U	U	U	N	U	U	N
wavyleaf thistle	U	U	U	U	N	N	N	N	U	U	U	U	N	N	N	N	N	N	N	N	U	U	U	U	N	N	N	N
western yarrow	U	U	U	U	N	U	U	N	U	U	U	U	N	U	U	N	N	U	U	N	U	U	U	U	N	U	U	N
wild onion	U	D	U	U	U	D	D	U	U	D	U	U	U	D	D	U	U	D	D	U	U	D	U	U	U	D	D	U
Shrubs																												
broom snakeweed	N	N	N	N	U	U	U	U	N	N	N	N	U	U	U	U	U	U	U	U	N	N	N	N	U	U	U	U
cactus	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
creeping juniper	U	N	N	U	U	N	N	U	U	N	N	U	U	N	N	U	U	N	N	U	U	N	N	U	U	N	N	U
fringed sagewort	U	U	U	U	U	U	U	U	U	U	U	U	U	D	D	U	U	P	P	D	U	U	U	U	U	U	U	D
kinnikinnick	N	N	N	N	D	U	D	P	N	N	N	N	D	U	D	P	D	U	U	D	N	N	N	N	D	U	D	P
rose	U	D	D	U	U	D	D	U	U	D	D	U	U	D	D	U	U	D	D	U	U	D	D	U	U	D	D	U
rubber rabbitbrush	N	N	N	N	D	U	U	D	N	N	N	N	D	U	U	D	U	D	D	U	N	N	N	N	D	U	U	U
skunkbush sumac	D	U	U	D	D	U	U	D	D	U	U	D	D	U	U	D	D	U	U	D	D	U	U	D	D	U	U	D
winterfat	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Cryptogams																												
clubmoss	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

N = not used; **U** = undesirable; **D** = desirable; **P** = preferred; **T** = toxic
† Quarters: 1 – Jan., Feb., Mar.; 2 – Apr., May, Jun.; 3 – Jul., Aug., Sep.; 4 – Oct., Nov., Dec.

Animal Community – Grazing Interpretations

The following table lists suggested initial stocking rates for cattle under continuous grazing (year long grazing or growing season long grazing) under normal growing conditions; however, *continuous grazing is not recommended.* These are conservative estimates that should be used only as guidelines in the initial stages of the conservation planning process and may need to be adjusted due to diet preferences of other types or kinds of livestock and/or other factors. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this, a field visit is recommended, in all cases, to document plant composition and production. More precise carrying capacity estimates should eventually be calculated using the following stocking rate information along with animal preference data, particularly when grazers other than cattle are involved. With consultation of the land manager, more intensive grazing management may result in improved harvest efficiencies and increased carrying capacity.

Plant Community	Production (lbs./acre)	Carrying Capacity [1] (AUM/acre)
Western Wheatgrass/Needlegrass/Plains Muhly	1400	0.44
Grama/Sedge	400	0.13
Low Plant Density, Excessive Litter	1300	0.41 [2]
Club Moss	350	0.11
Annual/Pioneer Perennial	-- [3]	-- [3]

[1] Continuous season-long grazing by cattle under average growing conditions.
[2] Stocking rates may need to be adjusted due to palatability and/or availability of forage.
[3] Highly variable; stocking rate needs to be determined onsite.

Hydrology Functions

Water is the principal factor limiting herbage production on this site. The site is dominated by soils in hydrologic group D. Infiltration varies from slow to moderately rapid and runoff potential varies from medium to high for this site depending on soil hydrologic group and ground cover. In many cases, areas with greater than 75 percent ground cover have the greatest potential for high infiltration and lower runoff. An exception would be where short grasses form a dense sod and dominate the site. Areas where ground cover is less than 50 percent have the greatest potential to have reduced infiltration and higher runoff (refer to Section 4, NRCS National Engineering Handbook, for runoff quantities and hydrologic curves).

Recreational Uses

This site provides hunting opportunities for upland game species. The wide varieties of plants which bloom from spring until fall have an esthetic value that appeals to visitors.

Wood Products

No appreciable wood products are present on the site.

Other Products

Seed harvest of native plant species can provide additional income on this site.

Supporting Information

Associated Sites

(054XY031ND) – Loamy
(054XY038ND) – Thin Loamy
(054XY035ND) – Very Shallow

Similar Sites

(054XY031ND) – Loamy (Ly)
[Does not receive additional moisture. Found on dry uplands upslope from loamy terraces or loamy overflow sites, down slope from thin loamy or shallow loam sites; similar landscape position as sandy, sands, clayey sites. Will ribbon greater than one inch and up to two inches. Indicator species are western wheatgrass some green needlegrass and blue grama, with fringed sagewort and western snowberry being the dominant shrubs. This site has more production, different landscape position, no restrictive layers above 20 inches, no little bluestem, plains muhly, and sideoats grama, more western wheatgrass, and green needlegrass.]

(054XY028ND) – Shallow Clayey (SwCy)
[Well drained soils more than 10 less than 20 inches to unweathered shales that restricts root penetration. Upslope of clayey site, surface layer will ribbon greater than two inches, upslope of clayey ecological site. Indicator species: western wheatgrass dominates with little bluestem, plains muhly, sideoats grama, and gayfeather. This site has similar species but less little bluestem and sideoats, more plains muhly, green needlegrass, western wheatgrass, restrictive layer above 20 inches is shale, slightly less production.]

(054XY043ND) – Shallow Sandy (SwSy)
[Some what excessively drained soils more than 10 less than 20 inches to sedimentary sandstone bedrock and/or gravels that restricts root penetration. Surface layer will ribbon less than one inch unless above gravels than more than one but less than two inches. Upslope from thin loamy, limy sands, sands, or sandy sites and some times down slope form very shallow ecological sites. Indicator species: little bluestem, prairie sandreed, sand bluestem, and needle grasses, with dotted gayfeather, pasqueflower, purple coneflower, and purple prairie clover, and shrubs like prairie rose and yucca. This site has similar species but more little bluestem, sand bluestem, prairie sandreed, and sedges, less plains muhly, green needlegrass, western wheatgrass, restrictive layer above 20 inches is sandstone or gravels, slightly more production.]

(054XY038ND) – Thin Loamy (TLy)
[Deep and moderately deep soils, usually calcareous within four inches to the surface, found on knobs and/or sideslopes of hills and buttes. Will form a ribbon greater than one inch but not more than two inches. Up slope of loamy and down slope of shallow loamy ecological sites. Indicator species: western wheatgrass, little bluestem, plains muhly, porcupinegrass, and sideoats grama, with Missouri goldenrod, dotted gayfeather, pasqueflower, purple coneflower, and purple prairie clover, and shrubs like winterfat and prairie rose. This site has similar species but more western wheatgrass, porcupine-grass, and/or green needlegrass, less little bluestem, plains muhly, blue grama and sideoats grama, more production, deeper soils, no restrictive layer above 20 inches.]

(054XY045ND) – Limy Sands (LSa)
[Moderately deep entisol, usually calcareous within four inches to the surface, found on knobs and/or sideslopes of hills and buttes; will not form a ribbon; up slope of sands or sandy and down slope from shallow sandy ecological sites. Indicator species: Little bluestem, sand bluestem, and prairie sandreed, along with penstemon, silverleaf scurfpea, purple coneflower, yucca, creeping juniper, and leadplant. This site has less western wheatgrass, plains muhly, green needlegrass, and sideoats grama, more little bluestem, sedges, prairie sandreed, and sand bluestem, more production, deeper soils, no restrictive layer above 20 inches.]

(054XY035ND) – Very Shallow (VS)
[Excessively well drained soils less than 10 inches to scoria or gravels bedrock that restricts root penetration, upslope of shallow clayey, shallow loamy, or shallow sandy ecological sites. Indicator species are little bluestem, sideoats grama, blue grama, purple coneflower, pasqueflower and creeping juniper. This site has similar species but more needleandthread, blue grama, and little bluestem, less plains muhly, green needlegrass, western wheatgrass, restrictive layer above 10 inches is scoria or gravels, less production.]

Inventory Data References

Information presented here has been derived from NRCS clipping and other inventory data. Also, field knowledge of range-trained personnel was used. All descriptions were peer reviewed and/or field tested by various private, state, and federal agency specialists.

Those involved in developing this site description include: Dennis Froemke, NRCS Range Management Specialist; Jeff Printz, NRCS State Range Management Specialist; Stan Boltz, NRCS Range Management Specialist; Darrell Vanderbusch, NRCS Resource Soil Scientist; L. Michael Stirling, NRCS Range Management Specialist; Dean Chamrad, NRCS State Range Management Specialist; Michael D. Brand, State Land Dept. Director Surface Management; David Dewald, NRCS State Biologist; and Brad Podoll, NRCS Biologist.

Data Source	Number of Records	Sample Period	State	County
SCS-RANGE-417	13	1968 – 1986	ND; SD	Dewey, Grant, Hettinger, Perkins, Slope, Ziebach
Ocular estimate	5	2000 – 2001	ND	Bowman, Dunn, Morton, Stark

State Correlation

This site has been correlated with Montana and South Dakota in MLRA 54.

Field Offices

Baker, MT	Buffalo, SD	Faith, SD	Mott, ND
Beach, ND	Carson, ND	Hettinger, ND	Selfridge, ND
Beulah, ND	Culbertson, MT	Killdeer, ND	Sidney, MT
Bison, SD	Dickinson, ND	Mandan, ND	Watford City, ND
Bowman, ND	Dupree, SD	McIntosh, SD	Wibaux, MT

Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States: 43a – Missouri Plateau.

Other References

High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE 68583-0728. (http://hpccsun.unl.edu).

USDA, NRCS. National Water and Climate Center, 101 SW Main, Suite 1600, Portland, OR 97204-3224. (http://www.wcc.nrcs.usda.gov).

USDA, NRCS. National Range and Pasture Handbook, September 1997

USDA, NRCS. National Soil Information System, Information Technology Center, 2150 Centre Avenue, Building A, Fort Collins, CO 80526. (http://nasis.nrcs.usda.gov).

USDA, NRCS. 2001. The PLANTS Database, Version 3.1 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

USDA, NRCS, Various Published Soil Surveys.

Site Description Approval

State Range Management Specialist	Date
State Range Management Specialist	Date
State Range Management Specialist	Date